

Title            Constitutive Relationships for Shelled Maize  
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### **Abstract**

Seventy-five triaxial tests were performed on identical specimens of shelled maize under five confining pressures of 30, 40, 50, 60 and 70 kPa, and five displacement rates of 0.5, 1, 2, 4 and 6 mm/min. Deviator stresses, volume strains and axial strains were measured in the experiment. The test results were used to determine the basic relationship between equivalent stress and equivalent strain, and the associated correlation between volume strain and equivalent strain which are needed for finite element analysis of granular material behaviour during discharge from silos. The equivalent stress increased gradually to an ultimate value at an equivalent strain of 20–25%. The volume strain decreased to a minimum value at a relatively low strain of 4–6% and then increased with increasing equivalent strain. The confining pressure had a marked effect on both the equivalent stress–equivalent strain and the volume strain–equivalent strain relationships. There appeared to be no discernible effect of displacement rate on these relationships. The paper presents two prediction equations: one expressing equivalent stress in terms of equivalent strain and confining pressure, and the other expressing volume strain as a function of equivalent strain and confining pressure.